Institution: University of Cambridge

Unit of Assessment: Anthropology and Development Studies

Title of case study: Parasitic infection in Bangladesh and the effectiveness of interventions.

1. Summary of the impact (indicative maximum 100 words)

Research conducted by Professor Nick Mascie-Taylor on the causes and effects of parasitic infection in Bangladesh, and on the effectiveness of different interventions, led directly to changes in government policy, the roll-out of drug and health education campaigns by the World Health Organisation and the World Bank, and ultimately a reduction in the prevalence of infection and an improvement in the health of Bangladeshi poor. For example, based on recommendations from this research, a two-drug strategy for the control of Filariasis commenced in Bangladesh in 2008; by 2010 twelve districts with high prevalence had been treated, resulting in ~27 million individuals receiving treatment. With this approach microfilaremia prevalence had fallen from about 15% to under 1%.

2. Underpinning research (indicative maximum 500 words)

Overview

Intestinal parasite infection (roundworm, hookworm and whipworm, known as 'geohelminths') – three of the thirteen neglected tropical diseases identified by the World Health Organisation (WHO) – represent a major public health problem in developing countries. Infection can lead to significant morbidity and mortality; intestinal parasitic infections are associated with undernutrition, poor growth and development, iron-deficiency anaemia, decreased physical fitness and work capacity, and impaired cognitive function. Together, hookworm, roundworm and whipworm account for an estimated 43.5 million disability adjusted life-years lost (DALY).

From 1994 onwards, Professor Nick Mascie-Taylor (Head of Department of Archaeology and Anthropology, University of Cambridge, 2011-15; University Lecturer since 1974) and members of his research group have conducted extensive research on parasitic infections in developing countries – including a programme of research projects in Bangladesh analysing the effects of parasitic infections on public health, which led to the impact reported here.

Professor Mascie-Taylor was the overall principal investigator for these projects, involving members from his research group and researchers/advisors from relevant public health institutes/ responsible bodies in Bangladesh such as the IEDCR – Institute of Epidemiology, Disease Control and Research, Dhaka, Bangladesh [Karim E, Akhtar]; IPHN – Institute of Public Health [Karim R, Ahmed]. Nutrition, Dhaka, Bangladesh; NIPSOM – National institute of preventive and social medicine, Dhaka, Bangladesh [Rahman]; WHO [Montanari]) and the University of Bangladesh/WHO [Alam].

Research

In Bangladesh, up to 90% of children are infected with one or more parasitic worm species,[(1)] with significant health implications: as Mascie-Taylor's research has shown, children free of gut parasites throughout childhood are about 4cm taller and weigh 12-14kg more than infected children.[(2)] On the basis of Professor Mascie Taylor's significant track record of working on parasite studies in Bangladesh, he was asked by the WHO to lead a pilot project from 1994-1996 to implement and analyse the first national intestinal parasite control pilot project in Bangladesh. This project was funded by the WHO and World Bank (see below). and it assessed through a randomised community trial the effects of (a) deworming alone, (b) health education alone and (c) the combined regimen of deworming and health education, on parasitic prevalence and intensity as well as nutritional status of 2151 children in rural Bangladesh.[(3)]

Children either received an anthelmintic drug (albendazole) or a placebo. The health educational package (comprising home visits, focus group discussions and visits to schools) aimed to

- increase awareness of worm transmission and the disabilities caused by intestinal helminths
- improve personal hygiene by hand washing before food preparation and consumption, and after defecation
- promote regular nail trimming, routine wearing of shoes, use of a latrine and use of clean water in cooking and washing of utensils.

Key insights

The results showed that a single dose of anthelmintic drug led to highly significant reductions in prevalence and intensity of infection. Moreover, households in the health education areas tended to construct latrines and drill tubewells (at their own cost); attitudes to and awareness of parasite transmission cycles improved, and shifts in behaviour led to improvements in sanitation and personal hygiene; house cleanliness improved, and the proportion of children wearing shoes and having trimmed nails increased significantly. The combined regimen of deworming and health education was associated with greatest reductions in prevalence and intensities for all three worms. Regular deworming was shown to be the most cost-effective way to improve health and well-being.[(1)(4)]

3. References to the research (indicative maximum of six references)

1. Mascie-Taylor CGN, Karim R, Karim E, Akhtar S, Ahmed T & Montanari RM (2003) The cost-effectiveness of health education in improving knowledge and awareness about intestinal parasites in rural Bangladesh. *Economics and Human Biology* 1, 321-330. doi: 10.1016/j.ehb.2003.08.001

2. Mascie-Taylor CGN, Karim E, Moji K, Rahman M and Minamoto K (2004). The relationship between maternal anthropometry and childhood malnutrition in rural Bangladesh. *Anthropologiai Kozlemenyek* **(***Anthropological Communications)*, 45, 109-118. Available from HEI.

3. Mascie-Taylor CGN, Mustafa Alam RM, Montanari R, Karim T, Ahmed EK, & Akhtar S (1999). A Study of the Cost Effectiveness of Selective Health Interventions for the Control of Intestinal Parasites in Rural Bangladesh. *Journal of Parasitology*, 85, 6–11. Available from HEI.

4. Mascie-Taylor CGN (1996) Intestinal Parasite Control in Bangladesh: a pilot project. *Environmental Sciences* 4, S095-S108. Available from HEI.

Research Grants

The research has been supported by the World Bank Consortium under the 4th Population and Health Project with the World Health Organisation as the Technical Executing Agency. World Bank Parasite Control in Bangladesh $700,000.

4. Details of the impact (indicative maximum 750 words)

The research led by Mascie-Taylor, and the pilot projects assessing the effectiveness of different interventions (both in the short and long term), have had direct impact on a number of organisations who support public health in Bangladesh, including the Government of Bangladesh (GoB), the World Health Organization (WHO) and the World Bank. The research has led to the **development and implementation of new policy and public health interventions**, and this has in turn **improved the health and well-being** of Bangladeshi poor.

The research was disseminated through a one-day conference in 1997 attended by key personnel from the World Bank, WHO, the Ministry of Health and Family Welfare (GoB) and the Directorate General of Health Services (GoB) as well as through a detailed report [(a)]. The report was submitted to The World Bank/WHO in 1997 and it included recommendations based on the research findings. Numerous further research papers jointly authored with representatives from the WHO and members of the GOB's public health implementing organisations (such as IPHN/ IEDCR) followed. Subsequently, most of the recommendations have since been accepted by GoB as an essential

feature of their intestinal parasite control measures.

For example, a recommendation of Mascie-Taylor's 1997 report was to give a single annual dose of 400 mg of albendazole to all vulnerable children as well as all school-aged children [a)] (see p.36: 7.3 '*Yearly single dose mass treatment with albendazole should be given to all eligible children and all family members during the National Immunization Day and/o in conjunction with the semi-annual Vitamin A capsule distribution. All school children should also be encouraged to receive albendazole at the same delivery point during National Immunizsation Days (NIDs) ….*' Between 2008 and 2013, a campaign based on this recommendation led to a WHO and UNICEF supported initiative 'Vitamin A Plus and Deworming Campaign' rolled out to over 100 million children aged 12-59 months of age. [(b)]

A second recommendation from the research following further health economic analysis (NMT 2003, ref 1 in section 2) was to run an education campaign promoting simple health messages (including washing hands with soap after defecation, wearing shoes and nail trimming) at the time of chemotherapy. The following statement at the end of this research paper, '*As a result of this research, the Government of Bangladesh has proposed that simple messages on the importance of hand washing before food preparation, regular nail trimming and wearing of shoes should be given at the time of mass chemotherapy as part of its health service delivery strategy.*' makes it clear that this research has had a direct influence on the Government of Bangladesh's approach to public health and indeed, this has resulted in a new public health programme.

This recommendation was initially taken forward by the setting up of a *Global Hand Washing Day* initiative which was organised by the Global Public Private Partnership on Hand Washing in October 2008. In that year more than 14.4 million Bangladeshi children from nearly 73,000 schools joined in this event, pledging to promote hand washing with soap after using the toilet and before eating.[(c)]

This impact has been sustained in subsequent years; each October up to 18 million school children (about 50% of all school aged children in Bangladesh) participate in an annual event, with discussions and demonstrations about using soap. In addition, messages are sent to Imams of the Islamic Foundation and journalists of the Press Clubs, and (via SMS) to 10,000 Community Hygiene Promoters through UNICEF. SMS messages are also sent to the general public through mobile companies at the request of Ministry of Local Government, Rural Development and Cooperatives.

A third recommendation of the report was for an annual mass drug administration (MDA) using two drugs in Filariasis-endemic areas of Bangladesh using either DEC or ivermectin and albendazole). (*see p.36; 7.4 ' Yearly single dose mass treatment with ivermectin and albendazole should be given to all the population in all filariasis endemic areas for at least three years …')[(a)].* The two-drug strategy for the control of Filariasis commenced in the northern districts of Bangladesh in 2008; by 2010, all twelve districts which had a prevalence of Filariasis above 10% had completed 6 MDAs with a coverage of between 79%-86% of the total population of the districts (estimated to be 27 million). Following this, microfilaremia prevalence has fallen from about 15% to under 1%.[(d)]

5. Sources to corroborate the impact (indicative maximum of 10 references)

a) Mascie-Taylor, CGN and Alam MM (1997) Report to WHO: *'Intestinal Parasite control project (pilot) - Final report on the impact of intervention strategies, their cost effectiveness and recommendations for future Intestinal Parasite Control in Bangladesh*'. Available from HEI. (Affiliations: Nicholas Mascie-Taylor, University of Cambridge, WHO/Short Term Consultant & Muhammad Mustafa Alam, University of Dhaka, WHO/National Consultant)

cont.

b) National Vitamin A Plus Campaign (NVAC) Institute for Public Health Nutrition (IPHN), Ministry of Health and Family Welfare, Government of Bangladesh (2011)
www.unicef.org/**bangladesh**/media_7037.htm

c) Global handwashing day www.unicef.org/**bangladesh**/media_6507.htm

d) Global Programme to Eliminate LF in Bangladesh